FACULTY OF AUTOMATION AND COMPUTERS

Bd. Vasile Pârvan, Nr. 2
300223 – Timişoara, Romania
Tel: +40-256-403211, +40-256-403212 **E-mail: decanat@cs.upt.ro**
Fax: +40-256-403214 **Web: www.ac.upt.ro**

RESEARCH GROUP IN AUTOMATION AND COMPUTERS

GENERAL PRESENTATION

The main aim of the group is to develop high-level research in the fields of automatic control, computer and software engineering and information technology. It offers the research results in these fields to interested companies and organizations all over the world.

Head of the Research Group: **Prof. dr. eng. Stefan PREITL**, recipient of the *Grigore Moisil* Prize of the Romanian Academy.
Tel: +40-256-403224, +40-256-403229
Fax: +40-256-403214 (at the Dean's office)
E-mail: *stefan.preitl@aut.upt.ro*
Web: *http://www.aut.upt.ro/~spreitl*

The group is organised in two research divisions:

- *Research Division in Automation and Industrial Informatics*

Head of division: **Prof. dr. eng Radu-Emil Precup**

- *Research Division in Computer Science and Engineering*

Head of division: **Prof. dr. eng. Marius Crişan**

RESEARCH DIVISION IN AUTOMATION AND INDUSTRIAL INFORMATICS

CONTACT

Prof. dr. eng. Radu-Emil PRECUP, recipient of the *Grigore Moisil* Prize of the Romanian Academy
Faculty of Automation and Computers
Department of Automation and Applied Informatics
Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel: +40-256-403229, +40-256-403226
Fax: +40-256-403214
E-mail: *radu.precup@aut.upt.ro*
Web: *http://www.aut.upt.ro/~rprecup*

Research in *PROCESS CONTROL*

RESEARCH TEAM

- Prof. dr. eng. Stefan Preitl, head of the team
- Prof. dr. eng. Radu-Emil Precup
- Dipl. eng. Claudia-Adina Dragoş, PhD student
- Dipl. eng. Mircea-Bogdan Rădac, PhD student
- Dipl. eng. Ion-Bogdan Ursache, PhD student
- Dipl. math. Petru Alexandru Clep, PhD student.

RESEARCH FIELDS

- Conventional control system structures
- Advanced control systems.

KEYWORDS

Fuzzy logic control; iterative methods; sliding mode control; intelligent systems; 2-DOF control; stability analysis; sensitivity analysis; mobile robots; servo systems; embedded systems; signal processing.

MAIN ACTIVITIES

- Development of conventional and advanced control systems
- Signal processing in control systems
- Soft computing in industrial applications
- Development of control systems for servo systems
- Development of control systems for mobile robots.

RESULTS

PUBLISHED PAPERS

1. Precup R.-E., Preitl St., Tar J.K., Tomescu M.L., Takács M., Korondi P., Baranyi P., *Fuzzy Control System Performance Enhancement by Iterative Learning Control*, IEEE Transactions on Industrial Electronics, ISSN 0278-0046, vol. 55, no. 9, 2008, pp. 3461–3475

2. Precup R.-E., Tomescu M.-L., Preitl St., Škrjanc I., *Stable Fuzzy Logic Control Solution for Lorenz Chaotic System Stabilizatio*n, International Journal of Artificial Intelligence, Indian Society for Development & Environment Research, ISSN 0974-0635, vol. 1, no. A08, 2008, pp. 23–33

3. Precup R.-E., Tomescu M.L., Preitl St., *Rule Base Modification of Takagi-Sugeno Fuzzy Logic Controllers to Guarantee System Stability*, Bulletins for Applied & Computer Mathematics, PAMM-Centre, Technical University of Budapest, Budapest, Hungary, ISSN 0133-3526, The PAMM's Life Supplement, Paper BAM-CII / 2008 nr. 2363, 2008, pp. 115–120.

4. Precup R.-E., Lee W.S., Rao M.V.C., Preitl Zs., *Linear and Fuzzy Control Solutions for Tape Drives*, Electrical Engineering (Archiv für Elektrotechnik), Springer-Verlag, ISSN 0948-7921, vol. 90, no. 5, 2008, pp. 361–377

5. Precup R.-E., Preitl St., Rudas I.J., Tomescu M.L., Tar J.K., *Design and Experiments for a Class of Fuzzy Controlled Servo Systems*, IEEE/ASME Transactions on Mechatronics,

ISSN 1083-4435, vol. 13, no. 1, 2008, pp. 22-35

6. Precup R.-E., Preitl St., Clep P.A., Ursache I.-B., Tar J.K., Fodor J., *Stable Fuzzy Control Systems with Iterative Feedback Tuning*, 12th International Conference on Intelligent Engineering Systems INES 2008, Miami, FL (USA), Proceedings, ISBN 978-1-4244-2083-4, 2008, pp. 287–292

7. Precup R.-E., Preitl St., Tomescu M.L., Petriu E.M., Tar J.K., Bărbulescu C., *Stable Iterative Feedback Tuning-based Design of Takagi-Sugeno PI-Fuzzy Controllers*, 2008 Conference on Human System Interaction HSI 2008, Krakow (Poland), Proceedings, ISBN 978-1-4244-1543-8, 2008, pp. 542–547 (Best Paper Award in the Area of Intelligent Control)

8. Precup R.-E., Preitl St., Fodor J., Ursache I.-B., Clep P.A., Kilyeni St., *Experimental Validation of Iterative Feedback Tuning Solutions for Inverted Pendulum Crane Mode Control*, 2008 Conference on Human System Interaction HSI 2008, Krakow (Poland), Proceedings, ISBN 978-1-4244-1543-8, 2008, pp. 536–541 Best Paper Award in the Area of Intelligent Control)

9. Precup R.-E., Preitl St., Tar J.K., Fodor J., Ursache I.-B., Clep P.A., *Low-Cost Fuzzy Logic Approach to Ship Course Control*, 50th International Symposium ELMAR-2008, Zadar (Croatia), Proceedings, ISBN 978-953-7044-06-0, 2008, vol. 2, pp. 423–426

10. Rădac M.-B., Precup R.-E., Preitl St., Tar J.K., Petriu E.M., *Linear and Fuzzy Control Solutions for a Laboratory Anti-lock Braking System*, 6th International Symposium on Intelligent Systems and Informatics SISY 2008, Subotica (Serbia), Proceedings, ISBN 978-1-4244-2407-8, CD-ROM, paper index 49, pp. 6

11. Preitl St., Precup R.-E., Clep P.A., Ursache I.-B., Fodor J., Škrjanc I., *Pole Placement Approaches for Linear and Fuzzy Systems*, 6th International Symposium on Intelligent Systems and Informatics SISY 2008, Subotica (Serbia), Proceedings, ISBN 978-1-4244-2407-8, CD-ROM, paper index 77, pp. 6

12. Tar J.K., Rudas I.J., Bitó J.F., Preitl St., Precup R-E., *Dynamic Friction Compensation in the Slotine-Li and in an SVD-Based Adaptive Control*, 17th International Workshop on Robotics in Alpe-Adria-Danube Region RAAD 2008, Ancona (Italy), Proceedings, Alexa Edizioni, ISBN 978-88-903709-0-8, 2008, CD-ROM, paper index 5, pp. 8

13. Precup R.-E., Preitl St., Petriu E.M., Tar J.K., Fodor J., *Iterative Learning-Based Fuzzy Control System*, IEEE International Workshop on Robotic and Sensors Environments ROSE 2008, Ottawa, ON (Canada), Proceedings, ISBN 978-1-4244-2594-5, 2008, pp. 25–28

14. Preitl St., Precup R.-E., Rădac M.-B., Dragoş C.-A., Tar J.K., Fodor J., *On the Stable Design of Stable Fuzzy Control Systems with Iterative Learning Control*, 9th International Symposium of Hungarian Researchers on Computational Intelligence and Informatics CINTI 2008, Budapest (Hungary), Proceedings, ISBN 978-963-7154-82-9, 2008, pp. 345–360

15. Rădac M.-B., Precup R.-E., Preitl St., Tar J.K., Fodor J., Petriu E.M., *Gain-Scheduling and Iterative Feedback Tuning of PI Controllers for Longitudinal Slip Control*, 6th IEEE International Conference on Computational Cybernetics ICCC 2008, Stara Lesna (Slovakia), Proceedings, ISBN 978-1-4244-2875-5, 2008, pp. 183–188

BOOKS

1. Preitl St., Precup R.-E. (Eds.), Design Techniques for Automatic Control Structures. Applications (in Romanian: Tehnici de proiectare a structurilor de reglare automata. Aplicatii), Editura Orizonturi Universitare Publishers, Timisoara, ISBN 978-973-638-252-9, 2008, pp. 107

RESEARCH GRANTS AND PROJECTS

National grants and projects

1. Research Grant of the National University Research Council (CNCSIS), Type A, no. 98GR, theme 14, code 370. Title: *Analysis and development of intelligent control systems with fuzzy controllers dedicated to servosystems*. Director: Prof. dr. eng. Stefan Preitl (granted value for 2008: 61,600 RON)

Research team: Prof. Stefan Preitl – project director, Prof. Radu-Emil Precup, MSc student Corina Ardelean.

Fuzzy control is one particular case of nonlinear control techniques. Fuzzy controllers are usually developed heuristically, and the evident necessity for systematic development methods of these controllers has not been covered till now. The iterative techniques are not generally connected to the process models. So they are used in embedded and mechatronic systems applications. The project offers systematic approaches with respect.

The controller structures and software created in the project were tested in servo systems control problems focused on different categories of processes. The experimental results highlight the control system performance enhancement. Approx. 14 papers were presented and/or published in journals and conference proceedings.

2. Research Grant of the National Centre for Programme Management (CNMP), Type PN2 Partnerships in Priority R&T Domains Programme (2008-2011), no. 12100 / 01.10.2008. Title: *Real-time informatics technologies for embedded-system-control of power-train in automotive design and applications (SICONA)*. Partners: "Politehnica" University of Timisoara (PUT) – P2, "Gh. Asachi" Technical University of Iasi – coordinator, Politehnica University of Bucharest – P1, SC Siemens VDO Automotive – P3. Director: Prof. dr. eng. Corneliu Lazăr (TUI), director of PUT partner (P2): Prof. dr. eng. Radu-Emil Precup (granted value for 2008: 0 RON)

Research team: Prof. Radu-Emil Precup – director of PUT partner (P2), Prof. Stefan Preitl, Assoc. Prof. Florin Drăgan, Lect. Dan Ungureanu-Anghel, Assist. Prof. Daniel Iercan, Assist. Prof. Emil Voişan, PhD student Petru Alexandru Clep, PhD student Ion-Bogdan Ursache, PhD student Mircea-Bogdan Radac, PhD and MSc student Claudia-Adina Dragoş, MSc student Ioan-Marius Mezin.

The main objective of the project consists in developing new informatics technologies for improving the performances of the embedded systems controlling the power-train of cars equipped with automated gearboxes. The project applies modern modelling and control strategies to the power-train and its subsystems. On these bases, real-time software modules are developed for the embedded systems, yielding much better operation performances than ensured by the currently used solutions (meaning PID regulation).

Several nonlinear and linearized models and low-cost control solutions for an electromagnetic actuator have been proposed and tested in 2008 by the research team at the P2 partner. They include Tensor Product-based models and S functions. The digital simulation results show the control system performance enhancement. Approx. 4 papers were presented and/or published in journals and conference proceedings.

International grants and projects

1. Bilateral research contract, 2008-2009, partners: "Politehnica" University of Timisoara (PUT), Romania, and Budapest Tech Polytechnical Institution (BMF), Hungary, Type PN2 Capacities Module III Programme (2008-2009), Protocol of the 4th Meeting of the Romanian-Hungarian Intergovernmental Committee on Cooperation in Science and Technology / 18.02.2008; RO ID 39 in Annex 2. Title: *Integration of Iterative Learning Control (ILC) and Fuzzy Methods in Intelligent Control Systems*. Directors: Prof. dr. eng. Stefan Preitl (PUT, Romanian partner) and Prof. dr. Janos Fodor (BMF, Hungarian partner) (granted value for 2008: 0 RON and 8.000 EUR)

Research team: Prof. Stefan Preitl – director of Romanian partner, Prof. Radu-Emil Precup – associate directror of Romanian partner, Assoc. Prof. Florin Drăgan, PhD student Ion-Bogdan Ursache, PhD student Petru Alexandru Clep, Assist. Prof. Emil Voişan, Assist Prof. Daniel Iercan, PhD and MSc student Claudia-Adina Dragoş.

The grant concerns the analysis, development and implementation of new intelligent fuzzy control structures, design techniques and applications on iterative feedback control. The mathematical support is very complex, and the approach needs a strong cooperation between specialist in mathematic/informatics and control engineers. Consequently, ILC techniques treated by the Romanian partner must be completed by Fuzzy logic techniques. Fuzzy logic is one of the primary research areas at the Hungarian partner.

Fuzzy controllers are developed usually in heuristic manner, and the obvious necessity for systematic development methods dedicated to these controllers has not been covered yet. Also, the sensitivity and stability analysis of fuzzy systems is in permanent actuality.

The two research teams co-organize biannually the International Symposiums on Applied Computational Intelligence and Informatics (SACI), in Timisoara, dedicated to the exchange of research results in the field. Approx. 10 joint papers were presented and/or published in journals and conference proceedings.

2. Bilateral research contract, 2008-2009, partners: "Politehnica" University of Timisoara (PUT), Romania, and University of Ljubljana (UL), Slovenia, Type PN2 Capacities Module III Programme (2008-2009), Protocol of the Third Meeting of the Joint Committee for Scientific and Technological Co-operation between Romania and the Republic of Slovenia / 11.12.2007-24.12.2007; ID no 3 in Annex 1. Title: *New results in development and applications of fuzzy control systems*. Directors: Prof. dr. eng. Radu-Emil Precup (PUT, Romanian partner) and Assoc. Prof. dr. Škrjanc (UL, Slovenian partner) (granted value for 2008: 0 RON and 8.000 EUR)

Research team: Radu-Emil Precup – director of Romanian partner, Prof. Prof. Stefan Preitl – associate directror of Romanian partner, Assoc. Prof. Florin Drăgan, Lect. Dan Ungureanu-Anghel, PhD student Ion-Bogdan Ursache, PhD student Petru Alexandru Clep, Assist. Prof. Emil Voişan, Assist Prof. Daniel Iercan, PhD and MSc student Claudia-Adina Dragoş, PhD student Mircea-Bogdan Rădac.

The grant deals with the development and implementation of new fuzzy control structures and design techniques that employ the stability analysis, the sensitivity analysis with respect to parametric variations of the controlled plants, the predictive control techniques and the fuzzy modelling. Several classes of fuzzy control systems are investigated. It is justified to unify and complement the efforts of the two research teams to contribute to better systematic application-oriented approaches resulting in low-cost fuzzy control systems.

The control solutions created by the two research teams are based on their previous experience. The results are tested in several industrial and non-industrial applications. The laboratory equipment at both partners allows the implementation of fuzzy controllers aiming the illustration of the performance improvements. Approx. 5 joint papers were presented and/or published in journals and conference proceedings.

PERSPECTIVE DOMAINS

- Methods for algorithmic design of conventional and intelligent controllers (fuzzy, neural, genetic, sliding mode)
- Methods for signal processing and computer-aided design of control systems
- Analysis and development of Intelligent Systems
- Solutions for automatic design of model-free control structures
- Control solutions in power systems, electrical drives, general industrial automation, mobile robots.

STRATEGIC PRIORITIES

- Control systems ensuring desired sensitivity
- Tools for computer-aided design of 2-DOF controllers
- Computer-aided techniques in Iterative Feedback Tuning and Iterative Learning Control
- Low cost solutions for control problems dedicated to mobile robots
- Derivative-free optimization of control systems
- Methods and tools to enable the systematic development of fuzzy control systems.

CONTACT

Prof. dr. eng. Stefan Preitl
Prof. dr. eng. Radu-Emil Precup

Faculty of Automation and Computers
Department of Automation and Applied Informatics
Bd. Vasile Parvan, no. 2
300223 Timişoara, Romania

Tel: +40-256-40-3229, -3224
Fax: +40-256-40-3214
E-mail: *{stefan.preitl, radu.precup}@aut.upt.ro*
Web: *http://www.aut.upt.ro/~spreitl,*
http://www.aut.upt.ro/~rprecup

Researches in *SYSTEM IDENTIFICATION, ADAPTIVE SYSTEMS, RENEWABLE ENERGY*

RESEARCH TEAM

- Prof. dr. eng. Octavian Proştean, head of team
- Prof.dr. eng. Nicolae Budişan
- Prof. dr. eng. Ioan Filip
- Assist. eng. Iosif Szeidert, PhD student
- Assist. eng. Cristian Vaşar, PhD student
- Assist. eng. Andreea Robu, PhD student

RESEARCH FIELDS

- System modelling, identification and simulation
- Unconventional energetic
- Neural networks and fuzzy systems
- Adaptive control systems

KEYWORDS

Modelling; identification and simulation of systems; neural networks and fuzzy systems; wind energy conversion systems; unconventional energetic; adaptive control; self-tuning.

MAIN ACTIVITIES

- Modelling, simulation and development of wind energy conversion systems (WECS)
- Identification and parameter estimation of electrical machines (asynchronous and synchronous)
- Development of new enhanced electrical machines types
- Development of control systems for WECS
- Control software development in industrial applications
- Modelling and simulation of systems with neural networks
- Development of WECS software
- Development of adaptive control structures
- Development of data acquisition systems.

RESULTS

PUBLISHED PAPERS

1. Szeidert I., Prostean O., Robu A., Jurca L., *Windmill's Design and Implementation Aspects*, 19th DAAAM International Symposium 2008 Intelligent Manufacturing & Automation, Trnava, Slovakia, Proceedings, ISSN 978-3-901509-68-1, Oct. 2008, pp. 1335–1336

2. Mihet-Popa L., Volosencu C., Jurca L., Prostean O., Szeidert I., *Simulation Algorithm Developed to Investigate the Effects of*

Various Rotor Faults in Cage Rotor Induction Machines, 8th WSEAS International Conference on Power Systems PS 2008, Santander, Cantabria, Spain, Proceedings, ISSN 1790-5117, ISBN 978-960-474-006-2, Sept. 2008, pp. 205–209

3. Budisan N., Groza V., Prostean O., Filip I., Biriescu M., Szeidert I., Stern M., *Rotation Speed and Wind Speed Indirect Measurement Methods for the Control of Windmills with Fixed Blades Turbine*, IEEE International Instrumentation & Measurement Technology Conference I2MTC 2008, Vancouver, Canada, Proceedings, ISBN 1-4244-1541-1, ISSN 1091-5281, May 2008, pp. 912–916
4. Mihet-Popa L., Groza V., Prostean O., Szeidert I., *Modeling and Design of a Grid Connection Control Mode for a Small Variable-speed Wind Turbine System*, IEEE International Instrumentation & Measurement Technology Conference I2MTC 2008, Vancouver, Canada, Proceedings, ISBN 1-4244-1541-1, ISSN 1091-5281, May 2008, pp. 730–733
5. Szeidert I., Prostean O., Filip I., Vasar C., Mihet-Popa L., *Issues Regarding the Modeling and Simulation of Wind Energy Conversion System's Components*, International Conference on Automation, Quality & Testing, Robotics AQTR 2008, Cluj-Napoca, Proceedings, ISBN 978-1-4244-2576-1, May 2008, pp. 225–228
6. Vasar C., Prostean O., Filip I., Szeidert I., Robu A., *Using Data Aggregation to Prolong the Lifetime of Wide-area Wireless*, IEEE 4th International Conference on Intelligent Computer Communication and Processing, Cluj-Napoca, Proceedings, ISBN 978-1-4244-2673-7, Aug. 2008, pp. 247–252
7. Mihet-Popa L., Prostean O., Szeidert I., *The Soft-Starters Modeling, Simulations and Control Implementation for 2 MW Constant Speed Wind Turbines*, International Review of Electrical Engineering IREE, no. 1, vol. 3, ISSN 1827-6660, Jan.-Feb. 2008, pp. 129–135
8. Mihet-Popa L., Prostean O., Szeidert I., *An Experimental Laboratory System for Monitoring and Detection of Electrical Drives Systems with Induction Machines*, International Scientific Journal Facta Universitatis, series Electronics and Energetics, Nis, Serbia, vol. 21, no. 1, ISSN 0353-3670, April 2008, pp. 44–48
9. Szeidert I., Prostean O., Filip I., Vasar C., Mihet-Popa L., *Issues Regarding the Wind Farm's Design and Implementation*, Scientific Buletin of "Politehnica" University of Timisoara, Transactions on Mechanics, ISSN 1224-6077, fascicol 1, Tom 53(67), 2008, pp. 141–144
10. Mihet-Popa L., Prostean G., Szeidert I., *Solar Energy Systems - Power Configuration and Topologies for photovoltaic systems*, Scientific Buletin of "Politehnica" University of Timisoara, Transactions on Mechanics, ISSN 1224-6077, fascicol 1, Tom 53(67), 2008, pp. 111–114
11. Vasar C., Filip I., Szeidert I., Robu A., *Considerations Regarding Optimizing Energy Consumption within Wireless Sensor Network Using Data Aggregation*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, June 2008, pp. 67–70
12. Szeidert I., Budisan N., Ungureanu D., Robu A., *Considerations on Induction Machine Modeling and Classic/ Neuro-Fuzzy Control Solutions Applied at Electrical Drives*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, June 2008, pp. 77-80

RESEARCH GRANTS AND PROJECTS

National grants and projects

1. National University Research Council (CNCSIS), research grant "*Researches regarding the control of new wind aggregates structures, with non-regulated blades and permanent magnet synchronous generator*", Grant Type A, CNCSIS Code 372/2008, Contract no. 98GR/11.06.2008, Director: Prof. Octavian Prostean, PhD, Financial value: 68,000 RON

The proposed project has the research theme, goal and objectives associated to the priority research domains at international level, researches regarding the control of new wind aggregates structures with vertical axis for conversion of renewable energies, with turbine self limiting blades, with non-regulated position. The thematic area concerns the increase of the usage degree of wind energy conversion systems as a non-pollutant energy source, conducting to the reducing of carbon emissions and pollution due to the usage of non-ecological resources (coal/gases/oil energy plants), highly pollutant, in concordance to the global trend of ecologic energy production. The scientific importance and the fundamental research character of the proposed grant resides from the fact that the researches regard a scientific domain of a real actual interest, the usage of vertical axis wind turbines with non regulated pitch blades and without limiting, with permanent magnet synchronous machines, having controlled rotation

through the load, operating optimally, with variable rotation, usable in urban space (roof-top wind generators). The researches are extremely opportune and focused towards the cost reduction, the performances and efficiency increase, the repayment time period reduction. All those will become possible due to new innovative solutions, among them subscribing the one forecasted within grant researches regarding new elements and structures of the conversion line of wind energy into electrical energy (the elimination of the gear-box, new generator constructions and frequency converters) and respectively new structures and control methods for wind aggregates. The scientific importance is sustained by the new, original proposed solutions, opening the means of effective applicability in the power energy domain, but not only.

PERSPECTIVE DOMAINS

- Real time control of induction and synchronous machines using LabView (LabWindowsCVI) using the National Instruments Data Acquisition Systems and by using DSpace hardware
- Advanced control of wind aggregates
- Neural network control systems

STRATEGIC PRIORITIES

- Study of innovative control systems for wind aggregates: MPPT methods, genetic algorithms
- Tools for statistical wind measurement related data, for short-term forecasting used in wind speed prediction based windmill control systems and for simulation of autonomous wind farms aggregates

CONTACT

Prof. Dr. Eng. Octavian Proştean
Faculty of Automation and Computers
Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel.: +40-256-40-3213
E-mail: *octavian.prostean@aut.upt.ro*

Researches in *MEDICAL INFORMATICS*

RESEARCH TEAM

- Prof. dr. eng. Lăcrămioara Stoicu-Tivadar, head of the team
- Prof. dr. eng. Vasile Stoicu-Tivadar,
- Lect. dr. eng. Dorin Berian
- Assist. eng. Romina Pintea, PhD student,
- Asists. eng. Raul Robu, PhD Student
- Assist. eng. Andreea Robu, PhD Student
- Eng. Vasile Topac, PhD student

RESEARCH FIELDS

- Health Information Systems, E-Health, Telemedicine
- Software architectures
- Distributed and Mobile Applications.

KEYWORDS

Distributed medical informatics; applied informatics; telemedicine, e-Health.

MAIN ACTIVITIES

- Development of mobile applications in medical informatics
- Study and development of different solutions for integrated healthcare networks.
- Implementation of standards in healthcare

RESULTS

PUBLISHED PAPERS

1. Stoicu-Tivadar L., Stoicu-Tivadar V, *SOA Approach as a Possible Future Solution for Better Healthcare Activity Management*, Studies in Health Technology and Informatics, Ed: S.K. Andersen, G.O. Klein, S. Schulz, J. Aarts and M.C. Mazzoleni, IOS Press, eHealth Beyond the Horizon - Get IT There, Proceedings of MIE2008, ISBN 978-1-58603-864-9, vol. 136, 2008, pp. 935

2. Moga V.D., Ciocirlie T., Moga M., Avram R., Stoicu-Tivadar L., Stoicu-Tivadar V., *Cardiological Diagnosis Network CARDIODIAGNET*, International Educational and Networking Forum for eHealth, Telemedicine and Health ICT Med-e-Tel 2008, Luxembourg, Global Medicine and eHealth Updates-Knowledge Resources, ISBN 1998-5509, vol. 1, 2008, pp. 1–6

3. Pintea R., Stoicu-Tivadar L., *Mobile Application Supporting the Activity of the Cardiology Department in a Hospital*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539x, vol. 1, June 2008, pp. 157–160

4. Morancea O., Stoicu-Tivadar L., Hariton C., *An Informatics System for Forensic Medicine - Can it work?*, 4th International Conference Telemedicine/Experience @ Prospects, Donetsk, Ucraina, Ukrainian Journal of Telemdicine and Medical Telematics, ISBN 1811-1688; 1728-936x, tom 1, 2008, pp. 159–163

PUBLISHED BOOKS

1. Korodi Adrian, Robu Raul, Pintea Romina, *Programarea Calculatoarelor*, Editura Politehnica, Timisoara, ISBN 978-973-625-649-3, 2008, 132 pp.

RESEARCH GRANTS AND PROJECTS

1. IBM Central/Eastern Europe, Middle East, and Africa (CEMA) Faculty Awards Program, *Analysing solutions for consistent healthcare services that support the continuity of care document representation using an IBM solution for SOA management.*

Participants: Lăcrămioara Stoicu-Tivadar, Vasile Stoicu-Tivadar, Dorin Berian, Romina Pintea ("Politehnica" University of Timişoara).
The objectives included: the analysis of the actual state of the art regarding evidence based medicine and the possibility to use SOA approach to the development of the domain, definition of the technical specifications for the proposed system, the development of the core of the application, integrating the specifications of the HL7 standard, the design and development of the HL7 interfaces that will allow the HIS to communicate with adjacent medical systems, inserting the results to the content of a lecture in a master program.

The R&D activities were:

- development of a Computer Cluster (2 Servers, 2 Workstations) for testing & validation of the solution
- Analysis of the WebSphere Business Services Fabric facilities for support in healthcare regarding message communication using HL7 standards;
- implementation
- testing
- dissemination of the results
- development of new Courses and Labs
- running the new developed Courses and Labs
- issuing the conclusions (final common meeting with medical and technical domain people).

The project gathered experiences from the medical and IT domains regarding the implementation of standards for communication of medical messages. The final goal was to ensure interoperability of systems in healthcare that will have as result lower costs on long term and a better clinical practice based on evidence from a large data set. The obtained results will help clients to achieve quicker (less time, less money) and more efficient implementation processes using service-oriented applications. The solution will try to find answers using the IBM key-segments from its offer of services and products: preparing IT infrastructure for SOA and creating SOA specialised on activity domains.
We used a new technological platform – based on SOA that support semantic standards. In the project we will do this research referring to HL7 standard. We intend to work using the IBM products HL7 CDA (Clinical Document Architecture) Builder. We studied and implemented the facilities offered by WebSphere Transformation Extender Pack for HL7, IBM WebSphere Transform Ext Pk HL7 V8.0.1. The hardware support was insured by IBM powerful equipment.
The project was financed by IBM Company, as a result of a worldwide competition.

2. 2nd Romanian National Research Program *TELEASIS – NGN support-based, Complex System for home tele-attendance of elderly people.*

Participants: academic, research and medical organisations and SME's from Bucureşti, Timişoara, Iaşi, Piteşti. Local staff: Lăcrămioara Stoicu-Tivadar, Vasile Stoicu-Tivadar, Dorin Berian, Romina Pintea, Raul Robu, Andreea Robu, Vasile Topac, ("Politehnica" University of Timişoara).
The main objective of the project is the development of a tele-support system for elderly people, from medical and social perspective, as well. This system has as a goal the implementation and development of the social and medical support services of elderly people, at their homes, in accordance with the fulfilment of the requirement of this category, to live in their own homes not in asylum. In this way, the project contributes to increase the active live duration of the people, and to optimise the customised management of the way of life of the assisted person.
The planned R&D activities will develop:

- an experimental model for a specific local intelligent unit for the homes of the elderly people
- an experimental model for the Teleassistace Centre
- the telecare network
- the specific database and the required software solutions
- a model of tele-attendance services
- a complete guide of the developed know-how and technology.

The project will contribute to the development of knowledge related to NGN networks, and

middleware technologies, to the development of the complex tele-attendance software systems.

3. 2nd Romanian National Research Program SIMIMED –*Integrated medical information management system based on HL7 Standard.*

Participants: academic and medical organisations and SME's from Cluj, Timişoara, and Braşov. Local staff: Lăcrămioara Stoicu-Tivadar, Vasile Stoicu-Tivadar, Dorin Berian, Romina Pintea, Raul Robu, Andreea Robu, Vasile Topac ("Politehnica" University of Timişoara).

The main objective of the project is the research, design and implementation of a pilot integrated system development for the management of the patients, human and material resources in a hospital (Hospital Information System – HIS), based on the more advances Standards form the medical informatics domain - HL7, DICOM, EN 13606, adapted to the needs of the Romanian Healthcare system.

The planned R&D activities are:

- The analysis of the actual context and the general design
- The technical specifications definition for the HIS
- The development of the kernel of the HIS, including the compliance with HL7 Standard
- The design and the implementation of the software modules for each medical speciality
- The design and development of HL7-compliant communication interfaces with other Healthcare information systems
- The enlargement of the partnership with other medical organisations in order to implement the results of the project

In this way, the project will develop a modular and flexible solution that one can adapt to any Healthcare organisation, and can integrate with other existing Healthcare Information systems.

PERSPECTIVE DOMAINS

a. Distributed architectures and appropriate technological solutions
b. Mobile applications and related technologies
c. Interoperability standards in distributed medical informatics
d. Solutions for integrated healthcare networks and interoperability

STRATEGIC PRIORITIES

The group intends to develop strategic researches on the directions specified in the domain by the European Community:

- The Education and Training of high level healthcare managers and policy makers on the strategic role of ICT in Healthcare and change management
- To implement programmes on education and training, and other actions to promote awareness and to reduce resistance to change of healthcare professionals
- To set up specific awareness actions addressing sensitive groups, such as: academic circles, high reputation specialists at university hospitals and other local medical opinion leaders, clinical research groups, medicine and nursing students
- To improve mutual learning for the transferring part too, particularly to avoid cultural mismatches

CONTACT

Prof. dr. eng. Lăcrămioara Stoicu-Tivadar

Faculty of Automation and Computers
Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel: +40-256-403234
Fax: +40-256-403214
Email: *lacramioara.stoicu-tivadar@aut.upt.ro*

Researches in *REAL-TIME CONTROL SYSTEMS*

RESEARCH TEAM

- Prof. dr. eng. Nicolae Robu, head of the team
- Prof. dr. eng. Gheorghe-Daniel Andreescu
- Prof. dr. eng. Toma-Leonida Dragomir
- Prof. dr. eng. Ioan SILEA
- Lecturer dr. eng. Sorin Nanu
- Assist. eng. Tiberiu Ionică
- Assist. eng. Ana-Maria Dan
- PhD. student eng. Cristian Schlezinger

RESEARCH FIELDS

- Advanced Control of AC drives: Sensorless Control of IPMSM; Fault-tolerant Control
- Automotive Electric Actuation Technologies
- Applications to Electric and Hybrid Vehicles.

KEYWORDS

Advanced control of electrical drives; Automotive electric actuation; Sensorless direct torque and flux control; State and disturbance observers; Variable structure flux-observer with signal injection; Active flux observer; Fault-tolerance; Fuzzy-interpolating implementation; Wind energy; Real-time implementations.

MAIN ACTIVITIES

- Control systems in Automotive electric actuation technologies
- Development of Sensorless control system with hybrid observer from zero speed for starter-generator with IPMSM for EHV
- Sensorless control of high-speed SPMSM
- Wind turbine PMSG sensorless control
- Real-time implementation and testing using DSpace for Sensorless control system of AC drives
- Informatics systems
- Solar energy.

RESULTS

PUBLISHED PAPERS

1. Andreescu G.-D., Pitic C.I., Blaabjerg F., Boldea I., *Combined Flux Observer with Signal Injection Enhancement for Wide Speed-Range Sensorless Direct Torque Control of IPMSM Drives*, IEEE Transactions on Energy Conversion, ISSN 0885-8969, vol. 23, no. 2, June 2008, pp. 393–402

2. Boldea I., Paicu M.C., Andreescu G.-D., *Active Flux Concept for Motion Sensorless Unified AC Drives*, IEEE Transactions on Power Electronics, ISSN 0885-8993, vol. 23, no. 5, Sept. 2008, pp. 2612–2818

3. Boldea I., Coroban-Schramel V., Andreescu G.-D., Scridon S., Blaabjerg F., *BEGA Starter/Alternator – Vector Control Implementation and Performance for Wide Speed Range at Unity Power Factor*, 43rd IEEE Industry Applications Society Annual Meeting IAS 2008, Edmonton, Alberta, Canada, Proceedings Conf. Record, ISBN 978-1-4244-2278-4, ISSN 0197-2618, Oct. 2008, pp. 1-8

4. Fătu M., Teodorescu R., Boldea I., Andreescu G.-D., Blaabjerg F., *I-F Starting Method with Smooth Transition to EMF Based Motion-Sensorless Vector Control of PM Synchronous Motor/ Generator*, 39th IEEE Power Electronics Specialists Conference PESC 2008, Rhodes, Greece, Proceedings, ISSN 0275-9306, ISBN 978-1-4244-1667-7, June 2008, pp. 1481–1487

5. Boldea I., Paicu M.C., Andreescu G.-D., Blaabjerg F., *"Active Flux" Orientation Vector Sensorless Control of IPMSM*, 11th International Conference on Optimization of Electrical and Electronic Equipment OPTIM 2008, Braşov, Romania, Proceedings, ISSN 1842-0133, ISBN 1-4244-1544-6(1), vol. 2A, May 2008, pp. 161–168

6. Ancuti R., Boldea I., Andreescu G.-D., Iles-Klumpner D., *Novel Motion Sensorless Control of High-Speed Small-Power SPMSM Drives: With Experiments*, 11th International Conference on Optimization of Electrical and Electronic Equipment OPTIM 2008, Braşov, Romania, Proceedings, ISSN 1842-0133, ISBN 1-4244-1544-6(1), vol. 3, May 2008, pp. 11–18

7. Paicu M.C., Tutelea L., Andreescu G.-D., Boldea I., *"Active Flux" Sensorless Vector Control of IPMSM for Wide Speed Range*, Journal of Electrical Engineering JEE, www.jee.ro, "Politehnica" Publishing House, Timişoara, ISSN 1582-4594, paper 8.4.16, vol. 8, no, 4, Dec. 2008, pp. 1–8

8. Boldea I., Andreescu G-D., Radulescu M.M., Cernat M., *Automotive Electric Actuator Technologies (AEAT) – Final Results, Contract X2C33*, Simpozionul CEEX Programul de cercetare de excelenţă 2005-2008 Contributii Stiintifice, UCP AMTRANS, Bucuresti, ISBN 978-973-0-05020-1, vol. 1, Nov. 2008, pp. 236–238

9. Urdea, G. Silea I., But A., *Adaptive Command for Circular Saw*, 11th International Conference on Optimization of Electrical and Electronic Equipment OPTIM 2008, Ed.: M. Cernat, Braşov, Romania, Proceedings, ISSN 1842-0133, ISBN 1-4244-1544-6(1), vol. 3, May 2008, pp. 137–142

RESEARCH GRANTS AND PROJECTS

National grants and projects

1. Research Grant of Excellence, Ministry of Education and Research, CEEX: X2C33/ 2006 *Automotive Electric Actuation Technologies (AEAT)*; Director: Prof. dr. eng. I. Boldea, UPT Scientific coordinator: Prof. dr. eng. G.-D. Andreescu (financial value for 2008 granted for the Dept. AIA: 58,000 lei)

The goal is to develop and propose novel electrical actuators with power electronics and control systems for various functions in automobiles such as: starter/alternator in hybrid electric or electric vehicles; active steering, steering and braking by wire, climate control, independent valve actuation, active suspension damping, etc., need - for comfort improvement, a reasonable energy consumption and robust response. Now, after the first 42Vdc mild hybrid electric Toyota Crown Royal has become commercial in 2002, there is world-wide interest and effort to introduce more and improve power electronic controlled actuators on automobiles.

The project is aiming at the following *objectives*:

- To develop and validate a 42Vdc battery model and an efficient battery state estimator in order

to optimally manage the energy consumption and storage on board of automobiles
- To propose a new power electronics control system for the claw-pole rotor alternator capable to work either at 14Vdc or 42Vdc for more power
- To develop better PMSM actuators and their advanced digital sensorless control with redundancy for active steering, steering-by-wire and electric braking-by-wire
- To develop new linear electric actuators for independent electric valve and active suspension damping control by power electronics for less peak power and energy consumption
- To investigate a novel starter/alternator configuration (Biaxial Excitation Generator for Automobiles-BEGA) and its control, characterized by very large constant power speed range, very low voltage regulation, good efficiency
- To propose and realize innovative small brushless electric actuators (less than 50W at 14/42Vdc) with low-cost electronic supply and control for various automotive accessories, such as: windshield wipers, window lifts, throttle plate control, positioning systems for lights, seats and rear mirrors, fuel injectors, cooling fans, blowers for HVAC, etc., as well as variable-speed pumps for oil, fuel and water. A V/F control with two novel stabilisation loops is proposed for high-speed IPMSM drives.

In 2008 – the final grant year, the main activities and results were to contribute for 4 experimental models realization and to do final experimental tests for all our objectives. There were elaborated the scientific and technical annual research report, and the final report on this subject. The research results have been published in international ISI journals and conference proceedings indexed in international data bases ISI-Proc., IEEE Xplore, INSPEC.

PERSPECTIVE DOMAINS

- Automotive control
- Advanced control of electric drives, Robotics
- Real-time control using LabView
- Applications with FPGA using VHDL, Xilinx.

STRATEGIC PRIORITIES

- Control of EHV and Automotive Electric Actuator Technologies
- DSpace platform, LabView real-time platform
- SCADA systems

CONTACT

Prof. dr. eng. Gheorghe-Daniel Andreescu

Department of Automation and Applied Informatics
Bd. Vasile Parvan, no. 2
300223 Timişoara, Romania

Tel.: +40-256-40-3245
Fax: +40-256-40-3214
E-mail: *daniel.andreescu@aut.upt.ro*
Web: *www.aut.upt.ro/~dandre*

RESEARCH DIVISION IN COMPUTER SCIENCE AND ENGINEERING

CONTACT

Prof. dr. eng. Marius CRIŞAN
Faculty of Automation and Computers
Department Computers and Software Engineering
Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel: +40-256-403254
Email: *marius.crisan@cs.upt.ro*

Researches in *EMBEDDED AND REAL-TIME SYSTEMS, DIGITAL SIGNAL PROCESSING*

RESEARCH TEAM

- Prof. dr. eng. Vladimir Creţu, head of the team
- Prof. dr. eng. Mircea Stratulat
- Prof. dr. eng. Mircea Popa
- Assoc. Prof. dr. eng. Mihai Micea
- Assoc. Prof. dr. eng. Ioana Şora
- Assoc. Prof. dr. eng. Doru Todincă
- Assoc. Prof. dr. eng. Marius Marcu
- Lect. dr. eng. Sorin Babii
- Assist. eng. Dan Chiciudean
- Assist. eng. Răzvan Cioargă
- Assist. eng. Bogdan Ciubotaru
- Assist. eng. Carmen Holotescu
- Assist. eng. Daniela Stanescu

MAIN ACTIVITIES

- Methods of Temperature and Power Reduction in Embedded Systems and their Applications
- Modeling, Design and Development of Real-Time Systems for Critical Applications of Data Acquisition, Signal Processing and Embedded Control
- Development of unconventional computer architectures
- New interfaces based on image and speech recognition.

RESULTS

PUBLISHED PAPERS

1. Tutac A.E., Racoceanu D., Leow W.K., Dalle J., Putti T., Xiong W., Cretu V., *„Translational Approach for Semi-Automatic Breast Cancer Grading Using a Knowledge-Guided Semantic Indexing of Histopathologt Images”*, 3rd Microscopic Image Analysis with Application in Biology International Workshop MIAAB in conjunction with

MICCAI 2008 Conference, Proceedings, in print, 2008

2. Tutac A.E., Racoceanu D., Putti T., Xiong W., Leow W.-K., Cretu V., *"Knowledge-Guided Semantic Indexing of Breast Cancer Histopathology Images"*, 1st International Conference on BioMedical Engineering and Informatics, Eds: Yonghong Peng and Yufeng Zhang, Proceedings, IEEE Computer Society, ISBN 978-0-7695-3118-2/08, May 2008, pp. 107-112

3. Kuczapski A.M., Trebuian S.M., Novac M.G., Micea M.V., Cretu V.I., Maniu L.A., *A Scheduling Strategy for Flexible Job Shop Factories with Probabilistic Events, Applicable in Semiconductor Industry*, Scientific Bulletin of "Politehnica" University of Timisoara, Transactions on Automatic Control and Computer Science ISSN 1224-600X, vol. 53(67), no. 4, Dec. 2008, pp. 225-232

4. Kuczapski A.M., Trebuian S.M., Novac M.G., Micea M.V., Cretu V.I., Maniu L.A., *Scheduling and Simulation of a Semiconductor Production Facility Using Petri Nets, Composite Dispatching Rules and Evolutionary Algorithms*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, vol. 1, June 2008, pp. 115-120

5. Barna C., Stratulat M., *Uncertainty Measurement in Video and Infrared Cameras System*, IEEE International Conference on Computational Intelligence for Measurement Systems and Applications CIMSA 2008, Istambul, Turky, Proceedings, ISBN 978-1-4244-2305-7, July 2008, pp. 1-3

6. Popescu B., Stancovici A., Szanto O., Fuicu S., Marcu M., *Intelligent Measuring and Control System for Honeybees' Life Support*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, vol. 2, June 2008, pp. 45-50

7. Marcu M., Tudor D., Fuicu S., Micea M.V., Copil-Crisan S., Maticu F., *Power Characterization of Multi-Threading Mobile Applications*, 12th WSEAS International Conference on Computers, Heraklion, Greece, Proceedings, ISBN 960-8457-47-5, July 2008, pp. 583-588

8. Micea M.V., Certejan C., Stangaciu V., Cioarga R., Cretu V., Petriu E., *Inter-Task Communication and Synchronization in the Hard Real-Time Compact Kernel HARETICK*, IEEE International Workshop on Robotic and Sensors Environments ROSE 2008, Ottawa, Canada, Proceedings, ISBN 978-1-4244-2594-5, Oct. 2008, pp. 19-24

9. Micea M.V., Carstoiu G., Ungurean L., Chiciudean D., Cretu V., Groza V., *Predictable Signal Generation with the Hard Real-Time Operating Kernel HARETICK*. IEEE International Workshop on Robotic and Sensors Environments ROSE 2008, Ottawa, Canada, Proceedings, ISBN 978-1-4244-2594-5, Oct. 2008, pp. 98-101

10. M. Marcu, D. Tudor, S. Fuicu, *A View on Power Efficiency of Multimedia Mobile Applications*, International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering CISSE 2008, Proceedings (book), ISBN 978-1-4020-8740-0, Dec. 2008, 6 pp.

11. Marcu M., Tudor D., Fuicu S., Moldovan H., Groza V., *An Execution Framework for Power Characterization of Mobile Applications*, IEEE International Instrumentation and Measurement Technology Conference I2MTC 2008, Victoria, Canada, Proceedings, ISBN 1-4244-1541-1, May 2008, pp. 382-387

12. Marcu M., Tudor D., Fuicu S., Copil-Crisan S., Maticu F., Micea M.V., *Power Efficiency Study of Multi-threading Applications for Multi-core Mobile Systems*, WSEAS Transactions on Computers, ISSN 1109-2750, vol. 7, no. 12, Dec. 2008, pp. 1875-1885

13. Piscoi P.-D., Marcu M., *Wireless Electronic Drums Using the IEEE 802.15.4 Standard*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, vol. 2, June 2008, pp. 41-44

14. Popa A.S., Popa M., Silea I., *Mobile Robot Navigation with Obstacle Avoidance Capability*, 13th International Power Electronics and Motion Control Conference EPE-PEMC 2008, Poznan, Poland, Proceedings, ISBN 978-1-4244-1741-4, Sept. 2008, pp. 1225-1232

15. Popa A.S., Popa M., Silea I., Varlan A., *Indoor Navigation of a Wheeled Mobile Robot*, Conference on Human System Interactions HSI'08, Crakow, Poland, Proceedings, ISBN 978-1-4244-1542-7, May 2008, pp. 1015-1020

16. Popa M., Moica C., Silea I., Ciocarlie H., *The Mobile Message Receiver System*, Innovations and Advanced Techniques in Systems, Computing Sciences and Software Engineering, Springer Netherlands, (book) ISBN 978-1-4020-8734-9, Sept. 2008, pp. 350-354

17. Cioarga R., Panus B., Oancea C., Micea M.V., Cretu V., Petriu E., *Fish Shoal Inspired Movement in Robotic Collectives*, International Workshop on Robotic and Sensors Environments ROSE 2008, Ottawa, Canada, Proceedings, ISBN 978-1-4244-2595-217-18, Oct. 2008, pp. 7-12

18. Cioarga R., Nalatan I., Tura-Bob S., Micea M., Cretu V., Biriescu M., Groza V., *Emergent Exploration and Resource Gathering in Collaborative Robotic Environments*, International Workshop on Robotic and Sensors Environments ROSE 2008, Ottawa, Canada, Proceedings, ISBN 978-1-4244-2595-2, Oct 2008, pp. 13-18

19. Stanescu D., Groza V., Stratulat M., Borca D., Ghergulescu I., *Robust Watermarking with High Bit Rate*, 3rd International Conference on Internet and Web Applications and Services ICIW 2008, Athena, Greece, Proceedings, ISBN 978-0-7695-3163-2, June 2008, pp. 257-260

20. Stanescu D., Groza V., Stratulat M., Borca D., *A Hybrid Watermarking Technique Using Singular Value Decomposition*, IEEE International Workshop on Haptic Audio visual Environments and Games HAVE 2008, Ottawa, Canada, Proceedings, ISBN 978-1-4244-2668-3, Oct. 2008, pp. 166-170

RESEARCH GRANTS AND PROJECTS

1. *FILOLET Innovative system for electrical energy monitoring based on wavelet transformation for industrial consumers* - contract with Alcatel, UPT, value 2147000 RON, director Micea Mihai
2. *FILOLET Innovative system for electrical energy monitoring based on wavelet transformation for industrial consumers* - contract with UEFISCSCU, MEdCI, value 20000 RON, director Micea Mihai
3. *SICRAMAS: Intelligent system for non-linear management of runner flow with asynchronous engines* - contract with UEFISCSCU, MEdCI, value 60000 RON, director Micea Mihai
4. *CORE-TX: Real-time systems embedded in complex applications of distributed artificial perception, collaborative robotized milieus and intelligent sensor networks* - contract with UEFISCSCU, MEdCI, value 15000 RON, director Mihai V. Micea
5. *MELISSEVS: Development and analysis of an integrated model for collaborative robotized milieus and intelligent sensor networks representation* - contract with UEFISCSCU, MEdCI, value 162000 RON, director Mihai V. Micea
6. *Developing and maintenance of plugging for IP monitoring application in GSM B11 system* - contract with Alcatel-Lucent, value 12000 RON, director Marcu Marius
7. *AI based technologies for the software infrastructure of next generation radio networks* - contract with CNCSIS, value 24000 RON, director director Todinca Doru

BOOKS

1. Stratulat Mircea, Stanescu Daniela, *Circuite si semnale numerice* , UPT Publ. Center, ISBN, 978-973-625-577-9, 290 pp., 2008
2. Micea Mihai V., *Telecomunicatii digitale moderne: Suport de curs, Editia a 3-a* , UPT Publ. Center, 138 pp., Comanda 270/2008

CONTACT

Prof. dr. eng. Vladimir Creţu
Director of the Computers and Software Engineering Department

Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel: +40-256-403 255
Fax: +40-256-403 214
Mob: +40-723-444 913
Email: *vladimir.cretu@cs.upt.ro*
Web: www.cs.upt.ro/~vcretu/

Researches in *DISTRIBUTED AND REAL-TIME SYSTEMS*

RESEARCH TEAM

- Prof. dr. eng. Ioan Jurca, head of the team
- Prof. dr. eng. Vladimir Creţu
- Prof. dr. eng. Horia Ciocârlie
- Assist. eng. Carmen Holotescu
- Assist. eng. Sorin Şerău
- Assist. eng. Dan Cosma
- Assist. eng. Stejărel Vereş
- Assist. eng. Adrian Petru Mierluţiu
- Assist. eng. Ciprian-Bogdan Chirilă
- Assist. eng. Georgiana Macariu

MAIN ACTIVITIES

- Programming and distributed processing media
- Network protocols
- Designing, implementing and testing real-time executives for systems based on various microprocessors
- Implementing and testing real-time executives for dedicated applications
- Extending real-time concepts in distributed applications
- Integrating Enterprise Applications into GRID-Type Networks Using Service-Oriented Software Architectures
- Methods, Techniques and Structures for Adaptive Computing Applications in Data Communications Field

RESULTS

PUBLISHED PAPERS

1. Mihut A., Ciocarlie H., *Implementing a Brokered Notification System for Grid Middleware,* 10th International Symposium on Symbolic and Numeric Algorithms for sScientific Computing SYNASC 2008, Timisoara, Romania, post Proceedings, IEEE Computer Soc. Press, IeAT Technical Report 08-13, Sept. 2008, pp. 63-74
2. Istin C., Pescaru D., Doboli A., Ciocarlie, H., *Unidirectional and Omni-Directional Sensing Coverage Management in ireless Sensor Networks,* Scientific Bulletin of "Politehnica" University of Timisoara, Romania, Transactions on Automatic Control and Computer Science, ISSN 1224-600X, vol. 53(67), no. 3, pp. 145-150
3. Jebelean C., Chirila C.-B., Maduta A., *Generating Logic-Based Representations for Programs,* 2008 IEEE 4th International Conference on Intelligent Computer Communication and Processing ICCP 2008, Cluj-Napoca, Romania, Proceedings , ISSN 978-1-4244-2673-7, vol. 1, Aug. 2008, pp. 145-151
4. Chirila C.-B., Jebelean C., Maduta A., *Towards Automatic Generation and Regeneration of Logic Representation for Object-Oriented Programming Languages,* 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, vol. 2, June 2008, pp. 13-18
5. Istin C., Pescaru D., Doboli A., Ciocarlie H., *Redundant Nodes Management in Wireless Sensor Networks,* 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, vol. 2, June 2008, pp. 115-118
6. Istin C., Pescaru D., Doboli A., Curiac D., Ciocarlie H., *Reliable Field of View Coverage in Video-Camera based Wireless Networks for Traffic Management Applications,* 8th IEEE International Symposium on Signal Processing and Information Technology ISSPIT 2008, Sarajevo, Bosnia, Proceedings, ISBN 978-1-4244-3555-5, Dec. 2008, pp. 63-68
7. Istin C., Pescaru D., Doboli A., Ciocarlie H., *Impact of Coverage Preservation Techniques on Prolonging the Network Lifetime in Traffic Surveillance Applications,* 4th IEEE International Conference on Intelligent Computer Communication and Processing ICCP'08, Cluj-Napoca, Romania, Proceedings, ISBN 978-1-4244-2673-7, Aug. 2008, pp. 201-206
8. Istin C., Pescaru D., Ciocarlie H., *Redundant Nodes Management in Wireless Sensor Networks,* 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539X, vol. 2, June 2008, pp. 115-118
9. Cernăzanu C., Holban Ş., *Training Neural Networks Using Input Data Characteristics,* 9th International Conference on Development and Application Systems, Suceava, Romania, Proceedings, ISBN 978-973-666-194-5, May 2008, pp. 309-311
10. Cernazanu-Glavan C., *Training Neural Network Using Input Data Characteristics,* Advances in Electrical and Computer Engineering, Univ. "Stefan cel Mare" of Suceava, Romania, ISSN 1582-7445, vol. 8(15), no. 2, Dec. 2008, pp. 65-70
11. CernaZanu-Glavan C., Holban Ş., *Improving Neural Network Performances – Training with Negative Examples,* Novel Algoritms and Techniques in Telecomunications, Automation and Industrial Electronics, book, ISBN 978-1-4020-8736-3, Aug. 2008, pp. 49-53
12. Cosma D.C., *niSiDe: Interactive Tool for Understanding Distributed Software,* 10th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing SYNASC 2008, Timisoara, Romania, Post Proceedings, IEEE Computer Soc., IeAT Technical Report 08-13, Sept. 2008, pp. 236-239
13. Carstea A., Macariu G., Frincu M., Petcu D., *Workflow Management for Symbolic Grid Services,* 10th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing SYNASC 2008, Timisoara, Romania, Post Proceedings, IEEE Computer Soc., IeAT Technical Report 08-13, Sept. 2008, pp. 5-12
14. Carstea A., Macariu G., *Towards a Grid Enabled Symbolic Computation Architecture,* Pollack Periodica, ISSN 1788-1994, vol. 3, no. 2, Sept. 2008, pp. 2-15
15. Carstea A., Macariu G., Petcu D., Konovalov A., *Pattern Based Composition of Web Services for Symbolic Computations,* 8th International Conference on Computational Science ICCS 2008, Cracow Poland, Proceedings, LNCS (Springer), ISSN 0302-9743, ISBN 978-3-540-69383-3, vol. 5101, June 2008, pp. 126-135
16. Carstea A., Frincu M., Konovalov A., Macariu G., Petcu D., *On Service-Oriented Symbolic Computing,* Parallel Processing and Applied Mathematics, LNCS (Springer), ISSN 0302-

9743, ISBN 978-3-540-68105-2, vol. 4967, May 2008, pp. 843-851

17. Tudor D., Cretu V., *Experiences on Grid Shared Data Programming*, 2nd International Workshop on P2P, Parallel Grid and Internet Computing (3PGIC-2008), Barcelona, Spain, Proceedings, ISBN 0-7695-3109-1, March 2008, pp. 390-395
18. Macariu G., Tudor D., Cretu V., *Designing a Dynamic Replication Engine for Grid Shared Data Programming*, 10th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing SYNASC 2008, Timisoara, Romania, Post Proceedings, IEEE Computer Soc., IeAT Technical Report 08-13, Sept. 2008, pp. 49-56
19. Macariu G., Carstea A., Frincu M., Petcu D., *Towards a Grid Oriented Architecture for Symbolic Computing*, International Symposium on Parallel and Distributed Computing ISPDC 2008, Krakow, Poland, Proceedings, ISBN 978-0-7695-3472-5, July 2008, pp. 259-266
20. Ciocarlie H., Vacarescu C.-M., *Considerations Regarding the Implementation of ESPL Programming Language*, International Journal of Computers, ISBN 1998-4308, issue 4, vol. 2, Dec. 2008, pp. 410-410
21. Ciocarlie H., Vacarescu C.-M., *Virtual Machine for Implementing the ESPL Programming Language*, 7th WSEAS International Conference on data Networks, Communications, Computers DNCOCO'08, Recent Advances in Computer Engineering, Bucharest, Romania, Proceedings, ISSN 1790-5109, ISBN 987-960-474-020-8, Nov. 2008, pp. 51-57
22. Teodorescu R.O., Cernazanu-Glavan C., Cretu V.I., *The use of the Medical Ontology for a Semantic-Based Fusion System In Biomedical Informatics - Application to Alzheimer Disease*, 4th International Conf. on Intelligent Computer Communication and Processing ICCP 2008, Cluj-Napoca, Romania, Proceedings, ISBN 978-4244-2673-7, vol. 1, Aug. 2008, pp. 265-258
23. Teodorescu R., Racoceanu D., Leow W.-K., Cretu V., *Prospective Study for Semantic Inter-Media Fusion in Content-Based Medical Image Retrieval*, Medical Imaging Technology, ISSN 0288-450X vol. 26, no.1, Jan. 2008, pp.48-58

RESEARCH GRANTS AND PROJECTS

1. *eMuCo Embedded Multi-Core Processing for Mobile Communications (STREP),* - contract with EU, FP7-EU, value 73000 Euro, director Cretu V., Ciocarlie H.
2. *Programming environment for real-time embedded distributed applications* - contract with CNCSIS, value 22000, director Ciocarlie Horia
3. *Fatigue studying and modeling in steel and aluminum bearer structures for random trials* - contract with CNCSIS, value 30000, director Ciocarlie Horia

CONTACT

Prof. dr. eng. Ioan Jurca

Computers and Software Engineering Department
Bd. Vasile Pârvan, no 2
300223 Timişoara, Romania
Tel: +40-256-403256
Email: *ionel@cs.utt.ro*

Researches in *ADVANCED COMPUTING ARCHITECTURES AND SYSTEMS*

RESEARCH TEAM

- Prof. dr. eng. Mircea Vladutiu
- Lecturer dr. eng. Marius Marcu
- Lecturer dr. eng. Lucian Prodan
- Lecturer dr. eng. Mihai Udrescu
- Assist. eng. Versavia Ancusa (PhD Student)
- eng. Alexandru Amaricai (PhD Student)
- eng. Răzvan Bogdan (PhD Student)
- eng. Oana Boncalo (PhD Student)
- eng. Cristian Ruican (PhD Student)

MAIN ACTIVITIES

- Watchdog processor for reliability increasing of computers
- Selftesting development concepts
- Selfchecking development tools
- Digital system testing based on data compression (transitions counting syndrome, linear feedback shift register)
- Equipment structures with fault tolerant capability (error detecting and correcting codes, triple modular redundancy)
- Bio-Inspired Design of Applications on Reconfigurable Platforms

RESULTS

PUBLISHED PAPERS

1. Amaricai A., Udrescu M., Vladutiu M., Prodan L., Boncalo O., *A Radix-4 Modified Booth Multiplication Algorithm*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539-X, vol. 2, June 2008, pp. 61-64
2. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., *Floating Point Divide-Add Fused for Newton's Interval Method*, Euromicro Work In Progress Session held in Conjunction with Euromicro SEAA 2008 and

Euromicro DSD 2008, Parma, Italy, Proceedings, ISBN 978-3-902457-20-3, Sept. 2008, pp. 31-32

3. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., *Floating Point Multiplication Rounding Schemes for Interval Arithmetic*, 19th IEEE Conference on Application Specific Systems, Architectures and Processors ASAP, Leuven, Belgium, Proceedings, ISBN 978-1-4244-1898-5, July 2008, pp. 19-24
4. Amaricai A., Vladutiu M., Prodan L., Udrescu M., Boncalo O., *Radix-4 Modified Booth Multiplication Algorithm*, 8th International Conference on Technical Informatics CONTI, Timisoara, Romania, Proceedings, ISSN 1844-539-X, vol. 2, June 2008, pp. 61-64
5. Ruican C., Udrescu M., Prodan L., Vladutiu M., *Software Architecture for Quantum Circuit Synthesis*, International Conference on Artificial Intelligence and Soft Computing ICAISC 2008, Zakopane, Poland, Proceedings, published in Computational Intelligence: Methods and Applications, ISBN 978-83-60434-50-5, June 2008, pp. 562-573
6. Prodan L., Udrescu M., Vladutiu M., *Fault-Tolerant Memory Design and Partitioning Issues in Embryonics*, 8th International Conf. Evolvable Systems: From Biology to Hardware ICES 2008, Prague, LNCS (Springer), ISSN 0302-9743, ISBN 978-3-540-85856-0, vol. 5216, Sept. 2008, pp. 372-381
7. Udrescu M., Boncalo O., Prodan L., Vladutiu M., Amaricai A., *Towards a Hybrid Methodology for Reliability Assessment of Quantum Circuits*, Euromicro Work In Progress Session held in Conjunction with Euromicro SEAA 2008 and Euromicro DSD 2008, Parma, Italy, Proceedings, ISBN 978-3-902457-20-3, Sept. 2008, pp. 37-38
8. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Assessing Quantum Circuits Reliability with Mutant-Based Simulated Fault Injection*, 8th IEEE International Conference on Nanotechnology Nano 2008, Arlington, TX, USA, Proceedings, ISBN 978-1-4244-2104-6, Aug. 2008
9. Boncalo O., Udrescu M., Prodan L., Vladutiu M., Amaricai A., *Error-Model Driven Analysis of Quantum Circuit's Reliability*, 8th IEEE International Conference on Nanotechnology Nano 2008, Arlington, TX, USA, Proceedings, ISBN 978-1-4244-2104-6, Aug. 2008, pp. 625-628
10. Bogdan R., Ancusa V., Vladutiu M., *Possible Threats in an Intelligent Sensor Grid*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539-X, vol. 2, June 2008, pp. 51-56
11. Bogdan R., Ancusa V., Vladutiu M., *Fault Tolerance Issues in Non-traditional Grids Implemented with Intelligent Agents*, 2nd International Conference on Computer and Electrical Engineering ICCEE 2008, Phuket, Thailand, Proceedings, ISBN 978-0-7695-3504-3, Dec. 2008
12. Ancusa V.M., *Extending the Consensus Problem*, Innovations and Advanced Techinques in Systems, Computing Sciences and Software Engineering, book, Springer Netherlands, ISBN 978-1-4020-8734-9, Aug. 2008, pp. 511-514
13. Ancusa V., *Message Redundancy in Sensor Networks Implemented with Intelligent Agents*, IEEE International Workshop on Robotic and Sensors Environments ROSE 2008, Ottawa, Canada, Proceedings, ISBN 978-1-4244-2594-5, Oct. 2008.
14. Ancusa V., Bogdan R., Vladutiu M., Susan L., *A Customized Population Screening Method for Osteoporosis and Osteoarthrosis*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-539-X, vol. 1, June 2008, pp. 171-174
15. Ancusa V., Bogdan R., Vladutiu M., *Discussing the Intelligent Agent Approach in Non-traditional Grids*, 5th International Conference on Cybernetics and Information Technologies, Systems and Applications CITSA 2008, Orlando, Florida, Proceedings, July 2008.
16. Ancusa V., Bogdan R., Vladutiu M., *Discussing Redundancy Issues in Intelligent Agent-Based Non-traditional Grids*, 12th International Conference on Knowledge-Based and Intelligent Information and Engineering Systems KES 2008, Zagreb, Croatia, Proceedings, Part II, LNAI (Springer), ISSN 0302-9743, ISBN 978-3-540-85564-4, vol. 5178, Sept. 2008, pp. 297-305
17. Ancusa V., Bogdan R., Vladutiu M., *Redundancy at Link Level for Non-traditional Grids Implemented with Intelligent Agents*, 4th International Conference on Networked Computing and Advanced Information Management NCM2008, Gyeongju, South Korea, Proceedings, ISBN 978-0-7695-3322-3, Sept. 2008, pp. 597-603
18. Petcu V., Amaricai A., Vladutiu M., *A Dual-Threaded Architecture for Interval Arithmetic Coprocessor with Shared Floating Point Units*,

11th IEEE Workshop on Design and Diagnostics of Electronic Circuits and Systems DDECS 2008, Bratislava, Slovakia, Proceedings, ISBN 978-1-4244-2276-0, April 2008, pp. 146-149

BOOKS

1. Amaricai Alexandru, *On the Design of Floating Point Units for Interval Arithmetic*, UPT Publ. Center, ISBN 978-973-625-795-7176 pp., 2008
2. Boncalo Oana, *Simulation Based Reliability Assessment of Quantum Circuits*, UPT Publ. Center, ISBN 978-973-625-796-4, 216 pp., 2008
3. Vladutiu Mircea, *Arhitectura si Organizarea Calculatoarelor. Vol. 1 Aritmetica Sistemelor de Calcul* , UPT Publ. Center, ISBN 978-973-625-709-4, 274 pp., 2008

RESEARCH GRANTS AND PROJECTS

1. *Design of Floating Point Units for Interval Arithmetic* - contract with CNCSIS - PN II, value 25480 RON, director Amaricai Alexandru
2. *Simulation Based Reliability Assessment of Quantum Circuits* - contract with CNCSIS - PN II, value 24800 RON, director Boncalo Oana
3. *Dependability estimation for emerging bioinspired systems using hierarchical reconfiguring strategies* - contract with CNCSIS, value 56640 RON, director Prodan Lucian
4. *Reversible and quantum circuits design for fault-tolerance* - contract with CNCSIS, value 70000 RON, director Udrescu Mihai
5. *Bioinspired architectures for reversible and quantum circuits* - contract with UPT, value 296000 RON, director Vladutiu Mircea

CONTACT

Prof. dr. eng. Mircea Vladutiu

Computers and Software Engineering Department
Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel: +40-256-403258
E-mail: *mvlad@cs.utt.ro*

Researches in *DISTRIBUTED DATA BASES AND ARTIFICIAL INTELLIGENCE*

RESEARCH TEAM

- Prof. dr. eng. Ionel Jian
- Prof. dr. eng. Ştefan Holban
- Prof. dr. eng. Marius Crişan
- Assoc. Prof. dr. eng. Dan Pescaru
- Lect. dr. eng. Sorin Babii
- Assist. eng. Cosmin Cernazanu
- Assist. eng. Dan Ciresan

MAIN ACTIVITIES

- Designing and implementing relational databases with complex network structures
- Pattern recognition in medicine and chemistry
- Development of a hybrid expert system (rules + neural network) for research in infectious diseases
- Implementing complex distributed databases and Internet access to databases in companies, banks and local administration
- Interdisciplinary cooperation for expert and cognitive systems development
- E-Learning Application-Oriented Intelligent Agent with Pedagogic Functions

PUBLISHED PAPERS

1. Doboli A., Curiac D., Pescaru D., Doboli S., Tang W., Volosencu C., Gilberti M., Banias O., Istin C., *Cities of the Future: Employing Wireless Sensor Networks for Efficient Decision Making in Complex Environments*, CEAS Technical Report, University of New York at Stony Brook, no. 831, pp. 1-26, TR, http://dspace.sunyconnect.suny.edu/handle/1951/43013

2. C. Cernazanu-Glavan, S. Holban, *Training Neural Networks Using Input Data Characteristics*, 9th International Conf. on Development and Application Systems, Suceava, Romania, Proceedings, ISBN 978-973-666-194-5, May 2008, pp. 309-311

3. Crisan M., *Chaos-Based Meaning Modeling*, 4th International Conference on Networked Computing and Advanced Information Management NCM2008, Gyeongju, South Korea, Proceedings, ISBN 978-0-7695-3322-3, vol. 2, Sept. 2008, pp. 314-319

4. Crisan M., Erzse G., *Anticipative Chaos Control in Population Models with the Allee Effect*, 2008 International Conference on Computer Engineering & Systems ICCES'08, Proceedings, ISBN 978-1-4244-2116-9, Nov. 2008, pp. 216-221

5. Crisan M., Erzse G., *Chaos-Based Anticipatory Agent*, 3rd 2008 International Conference on Convergence and Hybrid Information Technology ICCIT 2008, Proceedings, ISBN 978-0-7695-3407-7, vol. 2, Nov. 2008, pp. 692-695

6. Volosencu C., Curiac D., Banias, O. Ferent C., Pescaru D., Doboli A., *Hierarchical Approach for Lighting Control in Future Urban Environments*, IEEE-TTTC International Conference on Automation,

Quality and Testing, Robotics AQTR'08, Cluj-Napoca, Romania, Proceedings, ISBN 978-1-4244-2576-1, vol. 1, May 2008, pp. 158-163

7. Curiac D., Volosencu C., Pescaru D., Doboli A., *Using Wireless Sensor-Controller Networks for Distributed Control in High Reliability Applications*, 1st International Workshop on Sensor Networks at IEEE ICCCN-2008, Virgin Islands, USA, Proceedings, ISBN 979-1-4244-2389-7, Aug. 2008, pp. 32-37
8. Fuiorea D., Gui V., Pescaru D., Paraschiv P., Codruta I., Curiac D., Volosencu C., *Video-based Wireless Sensor Networks Localization Technique Based on Image Registration and SIFT Algorithm*, WSEAS Transactions on Computers, ISSN 1109-2750, vol. 7, no. 7, July 2008, pp. 990-999
9. Ciresan D., Pescaru D., *Off-line Recognition of Handwritten Numeral Strings Composed from Two-digits Partially Overlapped Using Convolutional Neural Networks*, 4th IEEE International Conference on Intelligent Computer Communication and Processing ICCP'08, Proceedings, Cluj-Napoca, Romania, ISBN 978-1-4244-2673-7, Aug. 2008, pp. 53-60
10. Pescaru D., Istin C., Curiac D., Doboli A., *Energy Saving Strategy for Video-based Sensor Networks under Field Coverage Preservation*, IEEE-TTTC International Conference on Automation, Quality and Testing, Robotics AQTR'08, Proceedings, ISBN 978-1-4244-2576-1, May 2008, pp. 289-294
11. Fuiorea D., Gui V., Pescaru D., Toma C., *Comparative Study on RANSAC and Mean Shift Algorithm*, Scientific Bulletin of "Politehnica" University, Transactions on Electronics and Communications, ISSN 1583-3380, vol. 53(67), no. 2, Sept. 2008, pp. 80-84
12. Fuiorea D., Gui V., Pescaru D., Paraschiv P., Istin C., Curiac D., Volosencu C., *Sensor Node Localization using SIFT Algorithm*, WSEAS International Conference on Automation and Information ICAI'08, Bucharest, Romania, Proceedings, ISBN 978-960-6766-77-02008, June 2008, pp. 436-442
13. Todinca D., Pescaru D., Vitalariu M., *OMNeT++ Models for Resource Allocation in Wireless Networks*, ACM International Workshop on OMNeT++, SimuTools 2008, Marseille, France, Proceedings, ISBN 978-963-9799-20-2, 2008, 8 pp.
14. Naghiu F., Petcu S., Pescaru D., *Expert System for Car Overtaking Assistance on National Roads*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-593X, vol. 2, June 2008, pp. 123-128
15. Szoke I., Holban Ş., *A Short Introduction in the History of Fractals*, 9th International Conference on Development and Application Systems, Suceava, Romania, Proceedings, ISBN 978-973-666-194-5, May 2008, pp. 179-181
16. Lungeanu D., Zaharie D., Holban S., Bernad E., Bari M., Noaghiu R., *Exploratory Analysis of Medical Coding Practices: The Relevance of Reported Data Quality in Obstetrics-Gynaecology*, Studies in Health Technology and Informatics, Amsterdam, IOS Press, ISBN 0926-9630, ISBN 978-1-58603-864-9, no. 136, Oct. 2008, pp. 839-844
17. Wang M., Subramanian V., Doboli A., Curiac D., Pescaru D., *Towards a Model and Specification for Visual Programming of Massively Distributed Embedded Systems*, IEEE International Workshop on Robotic and Sensors Environments ROSE, Ottawa, Canada, Proceedings, ISBN 978-1-4244-2594-5, Oct. 2008, pp. 81-86
18. Melita N.T., Holban S., *A Genetic Algorithm - Support Vector Machine Approach to DNA Microarrays Supervised Learning*, 9th International Conference on Development and Application Systems, Suceava, Romania, Proceedings, ISBN 978-973-666-194-5, May 2008, pp. 289-294
19. Melita N.T., Holban S., *A Genetic Algorithm Approach to DNA Microarrays Analysis of Pancreatic Cancer*, 9th International Conference on Development and Application Systems, Suceava, Romania, Proceedings, ISBN 978-973-666-194-5, May 2008, pp. 181-183
20. Melita N.T., Popescu I., Holban S., *A Genetic Algorithm Approach to DNA Microarrays Analysis of Pancreatic Cancer*, Advances in Electrical and Computer Engineering, Univ. "Stefan cel Mare" of Suceava, ISSN 1582-7445, vol. 8(15), no. 2, Dec. 2008, pp. 43-48
21. Sun P., Zhao Y., Gilberti M., Doboli A., Curiac D., Pescaru D., *Dynamic Reconfiguration of Mixed-Domain Embedded Systems for Applications with Variable Performance Requirements*, NASA/ESA Conference on Adaptive Hardware and Systems AHS-2008, Noordwijk, Netherlands, Proceedings, ISBN 978-0-7695-3166-3, June 2008, pp. 323-329

22. Parvu O., Jian I., *Bitmap Indexes on Graphics Procesing Unit*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1844-593X, vol. 2, June 2008, pp. 169-174

23. Petcu S.-A., Holban S., *Nine Men's Morris: Evaluation Functions*, 9th International Conference on Development and Application Systems, Suceava, Romania, Proceedings, ISBN 978-973-666-194-5, May 2008, pp. 89-92

BOOKS

1. Parvu Ovidiu, Jian Ionel, *Investment Decision Tool* , UPT Publ. Center, ISBN 978-973- 625, 38 pp., 2008

RESEARCH GRANTS AND PROJECTS

1. *MaternQual – Integrated informatics systems for complex evaluation of obstetrics related risk factors* - contract with Universitatea de Medicina si Farmacie "Victor Babes" din Timisoara – UMFVBT; Universitatea de Vest din Timisoara – UVT; Spitalul universitar de obstetrica-ginecologie "Dr. Dumitru Popescu" din Timisoara - TM05 Bridgeman srl, value 70431, director Holban Stefan
2. *Intelligent anticipatory agent oriented on decision and e-learning applications* - contract with CNCSIS, value 15.400 RON, director Crisan Marius

CONTACT

Prof. dr. eng. Marius Crişan
Faculty of Automation and Computers
Computers and Software Engineering Department
Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel: +40-256-403254
Email: *marius.crisan@cs.upt.ro*

Researches in *OBJECT-ORIENTED SOFTWARE ENGINEERING*

RESEARCH TEAM

- Assoc. Prof. dr. eng. Radu Marinescu
- Assoc. Prof. dr. eng. Marius Minea
- Assist. eng. Călin Jebeleanu
- Assist. eng. Cristina Marinescu
- Assist. eng. Petru Florin Mihancea
- Assist. eng. Adrian Mierlutiu
- Assist. eng. Dan Cosma
- Assist. eng. Ciprian Chirila

RESEARCH FIELDS

- Evolution and re-engineering of object-oriented software systems
- Software quality assurance
- Analysis and formal verification of software

KEYWORDS

Object-oriented software evolution; re-engineering; design faults; detection strategies; quality metrics; quality assurance; analysis tools; formal verification.

PUBLISHED PAPERS

1. Dozsa A., Girba T., Marinescu R., *How Lisp Systems Look Different*, 12th European Conference on Software Maintenance and Reengineering, CSMR 2008, Athens, Greece, Proceedings, ISBN 978-1-4244-2157-2, April 2008, pp. 223-232
2. Cosma D., Marinescu R., *Understanding the Impact of Distribution in Object-Oriented Distributed Systems using Structural Program Dependencies*, 12th European Conference on Software Maintenance and Reengineering, CSMR 2008, Athens, Greece, Proceedings, ISBN 978-1-4244-2157-2, April 2008, pp. 103-112
3. Mihancea F.P., *Towards a Reverse Engineering Dataflow Analysis Framework for Java and C++*, 10th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing SYNASC 2008, Timisoara, Romania, Post Proceedings, IEEE Computer Soc., IeAT Technical Report 08-13, Sept. 2008, pp. 222-225
4. Bulychev P., Minea M., *Duplicate Code Detection Using Anti-Unification* 2nd Spring Young Researchers Colloquium in Software Engineering, SYRCoSE 2008, St. Petersburg, Russia, Proceedings, ISBN 978-5-91474-006-8 vol. 2, May 2008, pp. 51-54

RESEARCH GRANTS AND PROJECTS

1. *Methods and tools for continuum quality insurance in complex software systems* - contract with UEFISCSU, value 205.515 RON, director Minea Marius
2. *Distribuited Enviroment for Control and Optimisation Characteristics of Distributed Software Systems* - contract with CNCSIS/ UEFISCSU, value 40.000 RON, director Marinescu Radu
3. *NanoSim: Micro/nanometric scale transport process in biomedicine and material science* - contract with Acad. Romana fil. Timisoara, UMF Bucuresti, UBB Cluj, UMF Timisoara, director Minea Marius
4. *ForMol Molecular biology inspired computation formalism* - contract with Univ. Iasi, Inst. Inf. Teor. Acad. Iasi, director Minea Marius
5. *Quality assurance in distributed software systems* - contract with MCTI, value 5617 RON, director Marinescu Cristina

6. *Timisoara Engineering Center accord* - contract with TRW Automotive, value 28949 EUR, director Minea Marius
7. *ARTIST2 – Embedded System Design* - contract with EU, FP6 NoE, director Minea Marius
8. *AVANTSSAR – Automated Validation of Trust and Security of Service-oriented Architectures* - contract with EU, FP7 STREP, value 24.000 EUR, director Minea Marius
9. *Cercetari in domeniul automatizarii procesului de testare software* - contract with Oce Software SRL, value 12700 RON, director Minea Marius
10. *Practical formal verification using automated reasoning and model checking* - contract with NTAS, INTAS, value 2700 EUR, director Minea Marius
11. *Reversed engineering techniques for class hierarchies* - contract with CNCSIS, value 30000 RON, director Mihancea Petru

CONTACT

Assoc. Prof. dr. eng. Radu Marinescu
Computers and Software Engineering Department

Bd. Vasile Pârvan, no. 2
300223 Timişoara, Romania
Tel: +40-256-404058
Email: *radu.marinescu@cs.upt.ro*
Web: *http://loose.upt.ro*

AUTONOMOUS RESEARCH GROUPS

DEPARTMENT OF AUTOMATION AND APPLIED INFORMATICS

MAIN RESEARCH FIELDS

- System theory applications in fault detection and diagnosis
- System analysis using sensitivities
- Development of control system devices
- Fuzzy and neural systems
- Virtual instrumentation in control
- Control of electrical drives
- Cryptology and information security
- Biomedical engineering

Research group in *APPLIED SYSTEMS THEORY*

RESEARCH TEAM

- Prof. dr. eng. Toma-Leonida Dragomir, head of the team
- Prof. dr. eng. Constantin Voloşencu
- Lecturer dr. eng. Dorina Popescu
- Lecturer dr. eng. Sorin Nanu
- Assist. eng. Ana Maria Dan
- Assist. dr. eng. Adrian Korodi

MAIN RESEARCH FIELDS

- System theory applications in fault detection and diagnosis
- System analysis using sensitivities
- Development of control system devices
- Fuzzy and neural systems
- Virtual instrumentation in control
- Control of electrical drives
- Management of the innovation and creativeness
- Sensor networks
- System identification

KEYWORDS

Fault detection; identification and diagnosis; modelling; system safety and availability; controller design; process control; interpolating strategies; fuzzy logic; neural networks; control of electrical drives; virtual instruments; sensor networks; system identification.

RESULTS

RESEARCH GRANTS AND PROJECTS

1. CNCSIS Grant, Code 360, theme no. 205, contract no. 58GR/19.05.06 (continued in 2007 and 2008), *Applied researches to develop virtual instruments for process monitorization, with application to the electrical drives.* Director: Assoc. Prof. dr. eng. Constantin Voloşencu

PAPERS

a. Dale S., Dragomir T.L., *Design Procedures of Some Interpolative Control Structures with Robustness Properties and Limitations*, CEAI, ISSN 1454-8658, vol. 10, no. 1, 2008, pp. 3–14

b. Bichiş C.D., Dragomir T.L., *On Modelling and Simulating Natural Gas Transmission Systems (Part I)*, CEAI, ISSN 1454-8658, vol. 10, no. 3, 2008, pp. 27–36

c. Bichiş C.D., Dragomir T.L., *On Modelling and Simulating Natural Gas Transmission*

Systems (Part II), CEAI, ISSN 1454-8658, vol. 10, no. 4, 2008, pp. 42–48

d. Nanu S., Dragomir L.E., Dragomir T.L., *Syncretic Project Subjects – Processes Associated to Academic Curricula Management*, Quality, Innovation and European Integration QIEI 2008, Sibiu, Proceedings, Sept. 2008

e. Zaharia S.E., Dragomir T.L., Nisioiu A.M., Sârbu M.A., *La Procédure Opérationnelle D'acpart Concernant L'implémentation du Cadre des Certifications Professionnelles*, UNISO 2008, Iasi, ISBN 978-973-0-06151-2, July 2008, pp. 119–132

CONTACT

Prof. dr. eng. Toma-Leonida Dragomir
Department of Automation and Applied Informatics

Bd. Vasile Pârvan, No. 2
300223 Timişoara, Romania
Tel.: +40-256-40-3222
Email: *toma.dragomir@aut.upt.ro*

For the field "Management of the innovation and creativeness"
Lect. dr. eng. Dorina Popescu
Tel.: +40-256-40-3231
Email: *dorina.popescu@aut.upt.ro*

Research group in *PROCESS CONTROL*

RESEARCH TEAM

- Lect. dr. eng. Florin Drăgan
- Assist. dr. eng. Daniel Iercan
- Assist. eng. Onuţ Lungu
- Assist. eng. Emil Voişan
- Assist. eng. Lucian Fedorovici

RESEARCH FIELDS

- Chaotic systems
- Programmable Logic Controllers
- Remote control
- Operating Systems
- Real-time Programming

KEYWORDS

Chaotic systems; programmable logic controllers; remote control

ACTIVITIES

- hard real-time technologies
- robot motion and control
- analysis and synthesis of the electronic converters with chaotic behaviour

PUBLISHED PAPERS

1. Chatterjee K., Ghosal A., Iercan Daniel, Kirsch C.M., Henzinger T.A., Pinello C., Sangiovanni-Vincentelli A.L., *Logical Reliability of Interacting Real-Time Tasks*, Design, Automation and Test in Europe DATE 2008, Munich, Germany, Proceedings, ISBN 978-3-9810801-4-8, March 2008, pp. 909–914

2. Voişan E., Voloşencu C., Leu A., *Fault Detection Using Virtual Environment and Wireless Robot*, 9th WSEAS International Conference on Automation and Information ICAI'08, Bucharest, Romania, Proceedings, ISBN 978-960-6766-77-0, June 2008, pp. 190–194

3. Voişan E., Drăgan F., Robu R., Gudiu A., *Robot Control Based on Virtual Environment and Voice Commands*, 8th International Conference on Technical Informatics CONTI 2008, Timisoara, Romania, Proceedings, ISSN 1232-500X, vol. 3, June 2008, pp. 77–80

4. Iercan Daniel, Mezin M., *A Distributed Multimode Real-Time Controller for the Three Tanks System*, 8th International Conference on Tehnical Informatics CONTI 2008, ReNeCoSy'2008, Timisoara, Romania, ISSN 1232-500X, June 2008, pp. 67–70

5. Iercan Daniel, Circiu E., Modeling in Simulink Temporal Behavior of a Real-Time Control Application Specified in HTL, Journal of Control Engineering and Applied Informatics CEAI, vol. 10, no. 4, 2008, pp. 55–62

BOOKS

Iercan Daniel, *Contributions to the Development of Real-Time Programming Techniques and Technologies*, Ed. Politehnica, Timisoara, ISBN 978-973-625-719-3, 2008, pp. 156

STRATEGIC PRIORITIES

- Control of chaotic systems;
- Hard real-time control;
- Remote control.

CONTACT

Florin Drăgan
Tel.: +40-256-288254
Email: *florin.dragan@aut.upt.ro*

Daniel Iercan
Tel.: +40-256-486968
Email: *daniel.iercan@aut.upt.ro*

Research group in *CRYPTOLOGY AND INFORMATION SECURITY*

RESEARCH TEAM

- Lecturer dr. eng. Dorina Petrică, head of team
- Phd. Eng. Bogdan Groza
- Assist. eng. Lavinia Dragomir
- Assist. eng. Raul Robu
- Assist. eng. Căiman Dadiana

- Eng. Murvay Pal-Ştefan
- Eng. Pop Dragoş-Liviu

RESEARCH FIELDS

- Authentication protocols
- Provable secure public-key cryptosystems
- Foundations of cryptology, number theory
- Applied cryptography, security for industrial control systems

KEYWORDS

Authentication protocols; digital signatures; public-key cryptography; entity authentication; message authentication; cryptography; cryptanalysis; one-way functions; trapdoor one-way functions; number theory; complexity theory.

PUBLISHED PAPERS

1. Groza B., *Broadcast Authentication with Practically Unbounded One-Way Chains*, Journal of Software (JSW), Academy Publishers, Finlanda, ISSN 1796-217X, vol. 3, no. 3, 2008, pp. 11-20
2. Groza B., Murvay P.S., Silea I., Ionica T., *Cryptographic Authentication on a 8051 Based Development Board*, 3rd International Conference on Internet Monitoring and Protection ICIMP 2008, Proceedings, ISBN 978-0-7695-3189-2, June 2008, pp. 92–97
3. Groza B., Dragomir T.L., *Using a Cryptographic Authentication Protocol for the Secure Control of a Robot over TCP/IP*, 2008 IEEE-TTTC International Conference on Automation, Quality and Testing, Robotics AQTR 2008, Cluj-Napoca, Proceedings, ISBN 978-1-4244-2576-1, vol. 1, May 2008, pp. 184–189
4. Groza B., Pop D., Silea I., *Java Implementation of an Authentication Protocol with Application on Mobile Phones*, 2008 IEEE-TTTC International Conference on Automation, Quality and Testing, Robotics AQTR 2008, Cluj-Napoca, Proceedings, ISBN 978-1-4244-2576-1, vol. 1, May 2008, pp. 190–194
5. Groza B., Alexandroni A., Silea I., *An Overview of the NTLM Authentication and Its Weaknesses in SharePoint Solutions*, 8th International Conference on Technical Informatics CONTI 2008, 1st Workshop on New Directions in Real-Time Networked Control Systems ReNeCoSy'2008, Timişoara, Proceedings, ISSN 1844-539X, vol. 3, June 2008, pp. 57–62
6. Groza B., Putanu E.A., Dragomir T.L. Petrica D., *Development of a Client-Server Platform for Simulation of Remote Control Systems from Matlab*, 14th National Conference of Electrical Drives CNAE 2008, Timisoara, Proceedings, ISSN 1582-7194, Sept. 2008, pp. 131–134
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8. Groza B., Dragomir T.-L., *Experimenting with the Secure Control of a Robot Over TCP/IP*, Automation Computers, Applied Mathematics ACAM, Cluj-Napoca, ISSN 1221-437X, vol. 17, no. 4, Dec. 2008, pp. 597–606
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2. Groza B., *Introducere in Inteligenta Artificiala - Aplicatii cu Strategii de Cautare Neinformate si Informate*, Editura Politehnica, Timisoara, ISBN 978-973-625-779-7, 2008.

CONTACT

Lect. dr. eng. Dorina Petrică
PhD. Eng. Bogdan Groza
Department of Automation and Applied Informatics

Bd. Vasile Pârvan, No. 2
300223 Timişoara, Romania
Tel.: +40-256-40-3244; +40-256-40-3242

Email: *dorina.petrica@aut.upt.ro, bogdan.groza@aut.upt.ro*

Research group in *BIOMEDICAL ENGINEERING*

RESEARCH TEAM

- Lect. dr. eng. Antonius N. Stanciu
- Lect. dr. eng. Adiana Albu
- Lect. dr. eng. Loredana M. Stanciu

RESEARCH FIELDS

- Friability of Medical Equipments
- Bionics
- Medical Diagnosis and Medical Informatics
- Artificial Intelligence (Expert Systems and Artificial Neural Networks)
- Medical Image Processing
- Human Hand Prosthesis
- Prehension

KEYWORDS

Cochlear implantation; medical diagnosis; expert systems; human hand prosthesis; prehension.

ACTIVITIES

- Testing protocols for patients with cochlear implants
- Development of a diagnosis system based on: expert systems (logical and statistical inference), artificial neural networks and medical images.
- Development of a artificial hand hydraulically actuated

PUBLISHED PAPERS

1. Albu A., Ungureanu L., *Medical Images used in a Diagnosis System*, Scientific Bulletin of "Politehnica" University of Timişoara, Transactions on Automatic Control and Computer Science, ISSN 1224-600X, vol. 53(67), no. 2, June 2008, pp. 95–98
2. Ungureanu L., Albu A., *The Dynamic Model of an Artificial Hand*, Scientific Bulletin of "Politehnica" University of Timişoara, Transactions on Electronics and Communications, ISSN 1583-3380, vol. 53(67), no. 1, Sept. 2008, pp. 137–140
3. Albu A., Stanciu L., *Medical Diagnosis System Based on CT Images*, 10th International Symposium "Young People and Multidisciplinary Research", Timişoara, Proceedings, ISSN 1843-6609, Nov. 2008, pp. 190–195
4. Ungureanu L., Stanciu A., *Hydraulically Actuated Artificial Hand Model*, Scientific Bulletin of "Politehnica" University of Timişoara, Transactions on Electronics and Communications, ISSN 1583-3380, vol. 53(67), no. 1, Sept. 2008, pp. 141–144

RESEARCH GRANTS

1. PN II Grant D1-1-019/18.09.2008, *Integrated system for management of medical information using HL7 standard - SIMIMED*, Director: Prof.dr.eng. Lăcrămioara STOICU-TIVADAR
2. PN II Grant 11-066/18.09.2007, *Complex system, on NGN support, for tele-assistance, at home, for old persons – TELEASIS*, Director: Prof.dr.eng. Lăcrămioara STOICU-TIVADAR
3. Research platform 5/22.04.2008, *Platform of implantology, intelligent prosthetic and biomechanical recovery*, Director: Conf.dr.eng. Mircea DREUCEAN

STRATEGIC PRIORITIES

- Testing protocols for cochlear implantation
- The communication interface between a hand prosthesis and the human body
- Decision-making using Bayesian Networks and Markov Chains

CONTACT

Lect. dr. eng. Loredana M. Stanciu
Department of Automation and Applied Informatics

2, Vasile Pârvan Blvd.
300223 Timişoara
Tel.: +40-256-403253
Email: *loredana.ungureanu@aut.upt.ro*